LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Sept. 24-28, 2012

CBS NEWS DEINVENTORY COMPLETE

National Nuclear Security Administration

The last of the Category I/II special nuclear material items that required the highest level of security at Lawrence Livermore has been removed.

Special nuclear materials, which include plutonium and forms of enriched uranium, have been delivered to Los Alamos National Laboratory, the Nevada Test Site, the Savannah River Site, the Y-12 Security Complex and the Idaho National Laboratory.

LLNL's primary mission will continue to be to ensure the safety, security and reliability of the nuclear weapons stockpile, but this mission will now be performed with a small quantity of special nuclear material, resulting in annual cost savings for taxpayers of approximately $40 million.

In 2006, the National Nuclear Security Administration (NNSA) began to develop a plan to transform the nuclear weapons enterprise and to consolidate special nuclear material as much as possible.

To read more, go to CBS.

R&D HIT ME WITH YOUR BEST SHOT

The JASPER two-stage gas gun, as seen from the loading port. The target chamber is visible in the background.

Lawrence Livermore's JASPER gas gun has fired its 100th shot.

JASPER (the Joint Actinide Shock Physics Experimental Research) is a key scientific tool for the National Nuclear Security Administration's Stockpile Stewardship Program (SSP). This program's combination of computer simulations, scientific theory and above-ground experiments has allowed the United States to maintain its nuclear deterrent for the past 20 years.

JASPER is a two-stage light gas gun, about 20 meters long, with a target chamber inside an 8-foot diameter containment vessel at the end.

JASPER's experiments at the Nevada National Security Site have enabled LLNL scientists to understand important properties and behaviors of plutonium and other special nuclear materials without conducting underground nuclear tests.

To read more, go to the *R&D Magazine*.

techradar.computing **SIXTEEN THOUSAND TRILLION AND COUNTING**

Sequoia

The No. 1 entry on the latest Top500 list of the world's fastest supercomputers goes to IBM's Sequoia system, housed at Lawrence Livermore.

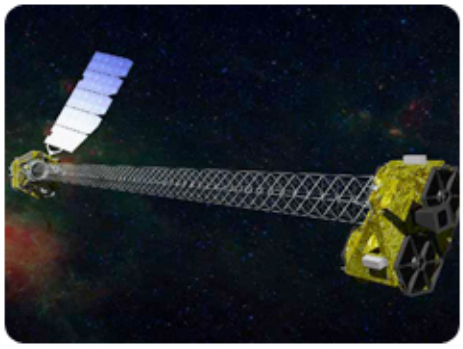
The system has set a record speed of 16.32 petaflops – more than 16 thousand trillion calculations per second.

Like the giant redwood that gives Sequoia its name, the world's fastest supercomputer isn't small. It occupies 3,422 square feet, and the Lab had to strengthen the floor of its building before it was installed. The 96 racks reportedly weigh as much as 30 adult elephants.

Sequoia was designed with a theoretical top speed of 20 petaflops. This makes it eight times more powerful than LLNL's previous number cruncher, Blue Gene/L, which was benchmarked at 478.2 teraflops and ruled the Top500 list from 2005-2008.

To read more, go to *techradar*.

PHYS.ORG NU DAYS IN SPACE



NuSTAR has a 30-foot mast that deploys after launch to separate the optics modules (right) from the detectors in the focal plane (left). Image courtesy of NASA/JPL-Caltech.

Last week marked 100 days since NASA's Nuclear Spectroscopic Telescope Array, or NuSTAR, launched into space.

Since completing its 30-day checkout, the telescope has been busy making its first observations of black holes, super-dense dead stars and the glowing remains of exploded stars. In this early mission phase, the NuSTAR team has been getting to know their telescope better and learning how to point it precisely at targets of interest.

Lawrence Livermore has played a large role in the project. For Livermore, the predecessor to NuSTAR was a balloon-borne instrument known as HEFT (the High Energy Focusing Telescope) that was funded, in part, by a Laboratory Directed Research and Development investment in 2001. NuSTAR takes HEFT's X-ray focusing abilities and sends them beyond Earth's atmosphere on a satellite. The optics design and the proposed production process for NuSTAR are based on those used to build the HEFT telescopes.

To read more, go to *phys.org*.

INTERNS PROLIFERATE

Lovely Umayan, Jennifer Dahnke, a colleague at the Laboratory and Karen Hogue (left to right).

Three Monterey Institute students from the Nonproliferation and Terrorism Studies master's degree program spent the summer as interns at the Laboratory under the National Nuclear Security Administration's Next Generation Safeguards Initiative. They had an opportunity to research an aspect of international safeguards that is of personal interest to them with access to "an incredibly diverse field of experts."

Jennifer Dahnke examined clandestine plutonium production in research reactors; Lovely Umayan developed a model for implementing the International Atomic Energy Agency's (IAEA) Additional Protocol in Argentina and Brazil through the Brazilian-Argentian Agency for Accounting and Control of Nuclear Materials; and Karen Hogue developed a tool for using the IAEA's State Level Concept for safeguards.

According to Dahnke, the experts at the Lab were "more than willing to consult with students on projects and give in-depth lectures in their area of expertise and/or tours of their labs."

To read more, go to the Monterey Institute of International Studies.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the *Livermore Lab Report*, send e-mail.